DOCUMENT RESUME

ED 304 466 TM 012 841

AUTHOR Frasier, Mary M.
TITLE Torrance Verbal and Figural Tests: Measuring General Creative Thinking Processes.
PUB DATE Aug 88
NOTE 16p.; Paper presented at the Annual Meeting of the American Psychological Association (96th, Atlanta, GA, August 12-16, 1988).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Cognitive Processes; *Cognitive Tests; Creative Teaching; *Creative Thinking; Creativity Research; Creativity Tests; Learning Strategies; Measures (Individuals); *Test Construction; *Verbal Tests
IDENTIFIERS Figural Creativity; *Torrance (E Paul); *Torrance Tests of Creative Thinking

ABSTRACT

The work of E. P. Torrance concerning creative thinking abilities, creative learning and teaching, the creative learning environment, and the measurement of creative thinking is discussed. Torrance began his pioneering research on the nature of creative thinking in 1958 with pilot testing of his first batteries designed to assess creative thinking abilities and the skill with which they are displayed, and creative motivations. His research is based on the concept that creativity is a natural human process of sensing incompleteness and disharmonies and then engaging in activities, consciously or unconsciously, to resolve the tensions created by this incompleteness. Torrance has attempted to create test batteries that model the creative process, such as the verbal Torrance Test of Creative Thinking (TTCT), which consists of seven activities. New streamlined scoring for the figural TTCT, which contains three activities, has greatly expanded the concept of creative strengths. The most significant impact of his research has been on educational applications. In 1966, Torrance proposed an instructional model for integrating the teaching of creative thinking skills into the teaching of subject matter. This Incubation Model focuses on what might be done to enhance creative thinking and actions. Current investigations into creativity, such as the work of R. J. Sternberg, have many links with Torrance's ideas. A chart summarizes relationships between ideas of Sternberg and Torrance. (SLD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED304466

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

MARY M. FRASIER

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Torrance Verbal and Figural Tests: Measuring General Creative Thinking Processes

Mary M. Frasier
Associate Professor, Educational Psychology
Director, Torrance Center for Creative Studies
University of Georgia
Athens, Georgia 30602

Paper presented at an Invited Symposium
Measurement of Creativity: Process and Product
Sponsored by Division 5, Evaluation and Measurement
Annual Convention of American Psychological Association

Atlanta, Georgia
August 15, 1988

TM012841

Torrance Verbal and Figural Tests: Measuring General Creative Thinking Processes

Mary M. Frasier
Torrance Center for Creative Studies
University of Georgia
Athens, Georgia 30602

One of the most persistent searches to unravel the mysteries of creative thinking abilities has been conducted by E. Paul Torrance. While he was not the first to be interested in the definition and assessment of creativity or the results of creative thinking, he has certainly been the one of the more consistent researchers.

Torrance's pioneering research into the nature of creative thinking formally began in 1958 with a pilot test of his first batteries designed to assess creative thinking abilities and the skill with which they are displayed, and creative motivations. Today, he is still actively involved in advancing thinking in the area of creativity through his continuing efforts "to experiment with new scoring concepts, methods of test administration, and new scoring procedures" (Torrance, 1986, p. 3).

His tests of creative thinking include three major batteries or groups of tests (Torrance, 1986):
(1) A general all-purpose battery, known as the Torrance Tests of Creative Thinking (TTCT), Figural and Verbal Forms A and B. These tests are designed for use with individuals from kindergarten through graduate and professional education.
(2) Thinking Creatively With Sounds and Words (TCSW), jointly developed by Torrance, Khatena, and Cunnington (1981 to assess the ability to produce and interpret imagery and predict creative behavior.
(3) Thinking Creatively in Action and Movement (TCAM) (Torrance, 1981) developed for use with preschool children and others with limited verbal and drawing skills. Responses to the TCAM may be in action and movement or words and is especially suitable for 3, 4, and 5 year olds.

The purpose of this paper is three-fold. First, I will discuss the principles that support Torrance's approach to measuring general creative thinking processes through a brief presentation and discussion of (a) his definition of creativity; (b) the rationale for the approach he has taken in designing test activities; (c) and the relevance of his findings in the stimulation of the higher mental processes he believes are associated with creative thinking. Second, I will present the rationale for new scoring procedures that he has developed to further explain his approach to assessment of creative thinking abilities and the ways in which research in this area may further contribute to the

enhancement of creative thinking abilities. Finally, I will discuss selected findings from Torrance's research within the context of current investigations into the nature of creativity.

Definition.

When Torrance began his research program, it was based on the premise that if creativity was to be viewed scientifically, it had to be defined in such a way that it could be objectively observed and measured and it had to be compatible with common and historical usage (Torrance, 1966). Thus, the definition that has provided the basis for his research is based on the concept that creativity is "a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies; testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results (Torrance, 1966, p. 6).

This definition, as Torrance explains it, refers to creativity as the natural human process of sensing incompleteness and disharmonies, and then engaging in activities, consciously or unconsciously, to resolve the tensions created by this incompleteness. He favored this definition because it provided a reasonable basis for investigating the kinds of abilities, mental functioning, and personality characteristics that faciliate or inhibit the process; for specifying the kinds of products that result from that process; for describing the pesons who would seem to have the greatest success in the process; and finally, for describing the nature of the environment that best facilitates the process (Torrance, 1966). It should be noted that he chose not to focus on any one component of creativity, but rather attempted to be more holistic in his approach by looking at the person, the process, the product and the environment.

The Rationale for TTCT Test Activities

In the development of the TTCT, Torrance departed from the factor type tests developed by Guilford and deliberately attempted to construct test activities that modeled the creative process (Torrance, 1974). His goal was to develop activities that would (1) involve different kinds of thinking, (2) would be interesting and challenging for individuals at all educational levels from kindergarten through graduate school, and (3) would contribute to the development and refinement of his test batteries. That his goal has been partially realized is exemplified by the interest that has been displayed in his tests. The TTCT, first published in 1966, have now been used in over 1500 studies and have been translated into more than 32 languages.

The Verbal TTCT, forms A and B, consists of seven activities. The first three activities are based on an intriguing picture designed to elicit three types of responses: (1) Activity 1, generate questions that would help to discover what is happening

in the picture; (2) Activity 2, list possible causes of the action depicted in the picture; and (3) Activity 3, list possible consequences of the action depicted in the picture stimulus. These activities were included in order to allow subjects an opportunity to express their curiosity and provide a picture of their ability to develop hypotheses and think in terms of possibles.

Torrance (1974) and de Bono (1976) both consider the asking of provocative questions to be central to the understanding and development of creative thinking abilities. Torrance (1974) has noted that

> In creative learning and teaching, it is important that questions (be used) to encourage children to extend their thinking and to see new relationships; to discover gaps in their knowledge (p. 210).

The aim of the asking activities is to discover individual strengths and weaknesses through the asking of thought provoking, hypothetical questions because it encourages a display of sensitivity to what is unknown and to gaps in knowledge. Provocative questioning is extended throughout the other two activities by encouraging display of the ability to formulate hypotheses concerning cause and effect. In evaluating performance on the first three activities, emphasis is on the statistical infrequency of questions, causes, or consequences. According to Torrance (1974) such infrequency represents a mental leap or departure from the obvious and commonplace and gives one measure of originality.

In Activity 4 subjects are asked to improve a toy so that children will have more fun playing with it. A great deal of interest is stimulated by this activity for it frees the subject to play with an idea. Torrance (1974) has noted that this activity almost always seems to make sense to people for it fits their notion of a desirable type of thinking.

Activity 5 is designed to elicit unusual uses for a common object. It gives insights into an individual's ability to see unlimited potential in things that others may consider routine. It also helps to test a subjects ability to become free from habitual and well-established mind sets.

Activity 6 requests the responder to generate unusual questions about the object in Activity 5. When applied in the classroom students are not only asked to generage unusual thought-provking questions but they are also requested to distinguish the more provocative from the less provocative questions (Torrance & Myers, 1974).

Activity 7 was designed to elicit all the possible things that would happen if the given improbable situation were true. Though this activity is a variation of the Guess Consequences Activity of the Ask-and-Guess series, it was designed to elicit a higher degree of fantasy. Torrance (1974) saw this kind of thinking as being highly important in assessing the ability to behave creatively.

Each verbal activity is scored for fluency, flexibility (except activity 6) and originality. Torrance does not encourage the use of a verbal elaboration score even though he does not discourage experimentation.

The Figural TTCT, forms A and B, consists of three activities: Activity 1, Picture Construction; Activity 2, Incomplete Figures; and Activity 3, Repeated Figures. These activities were designed to represent "three different aspects of creativity or three different creative tendencies" (Torrance 1974).

Picture Construction assesses the ability to find a purpose for something that has no discernible purpose and then to elaborate it in such a way that a meaningful purpose is achieved. The Incomplete Figures Activity relates to Torrance's notion that incompleteness creates tension that must be resolved. This tension, however, must be controlled long enough for the subject to make the mental leap necessary to get away from the obvious and commonplace.

The Repeated Figures activity consists of the repetition of a single stimulus (Circles, Figural B and sets of parallel lines, Figural A). This activity assesses the ability to return again and again to the same stimulus, but to perceive it each time in a different way.

The complexity of the figural activities are varied through the instructions: Task 1, originality or unusualness with the secondary motivation being elaboration; Task II, flexibility or variety of responses is added to originality and elaboration; and Task III, fluency, originality, elaboration and flexibility.

Scoring the TTCT

The concept of creative strength has always been important in the scoring both the verbal and the figural TTCT. Creative strengths are defined by those responses that go much beyond what is learned, practiced, habitual, and common place (Torrance, 1974). Since more intellectual energy is required to produce such responses, they are characterized as showing creative strength.

The concept of creative strengths has been greatly expanded in the new streamlined scoring for the Figural TTCT, forms A and B. Streamlined scoring is not yet available for the Verbal TTCT.

Streamlined scoring responds to those who felt that (1) the original scoring method was too time-consuming and (2) the TTCT assessed only divergent production abilities and did not tap those abilities that were the essence of creativity (Torrance and Ball, 1984). As a result, Torrance and his associates have spent nine years identifying and experimenting with other norm-referenced measures and criterion-referenced indicators. The streamlined scoring method, thus, has been restructered to include five

norm-referenced measures (fluency, originality, abstractness of titles, elaboration, and resistance to premature closure) and thirteen criterion- referenced measures (emotional expressiveness, storytelling articulateness, movement or action, expressiveness of titles, synthesis of incomplete figures, synthesis of lines on Form A, synthesis of circles on Form B, unusual visualization, internal visualization, extending or breaking boundaries, humor, richness of imagery, colorfulness of imagery, and fantasy).(See Appendix A).

Abstractness of Titles is based on the idea that creativity requires one to sense the essence of a problemand to know what is truly essential. This is reflected in the level of abstraction given to the titles of the pictures drawn, especially in response to the Picture Construction and Picture Completion activities. Resistance to Premature Closure is based on the generally accepted conclusion that a person must "keep open" in processing information in order to consider a variety of information (Torrance & Ball, 1984).

The rationale for the criterion referenced masures is fully explained in The Search for Satori and Creativity (Torrance & Ball, 1984). These measures were identified from surveying the creativity literature with special attention to the attributes of creative persons and from examining historical accounts of great creative achievements. The indicators that were retained for further study had to meet three additional criteria. They were capable of being clearly manifested in test performances; they had adequate frequency of occurence, and they were amenable to change as a result of training, instruction, and practice (Torrance & Ball, 1984).

Torrance's Rationale for the Use of Creativity Tests

Creativity tests have been widely criticized because of their limited reliability and validity. Sternberg (1988) has argued that a major reason for this criticism is that test designed to assess creativity have not based on any theory that adequately defines the construct of creativity. Treffinger (1979), however has cautioned against expecting too much from any single instrument and against assuming that tests of creativity, thus far developed, have even claimed to assess every dimension of creativity.

Torrance has always made the latter claim and does not suggest that his tests, singularly or in combination, measure every dimension of creativity. The TTCT was designed to measure what he has always called "creative thinking abilities" or that constellation of generalized mental abilities commonly presumed to be brought into play in creative achievements. He has maintained that high degrees of abilities measured by the TTCT increase the chances that the possessor will behave creatively but do not guarantee such behavior any more than a high degree of intelligence guarantees intelligent behavior (Torrance & Ball, 1984).

In later efforts to help people understand the concept of creative thinking abilities, he has developed a visual representation of the basic dimensions of this complex and elusive phenomenon. (Insert Figure 1 about here). The purpose of this visual representation is to illustrate that creative achievement depends on a combination of creative motivations, skills and abilities. The successful interaction of these basic components may be hampered by any number of factors: lack of societal support and encouragement, lack of sufficient intrinsic motivation -- creative motivation or commitment -- to use one's creative abilities, or lack of opportunities to sufficiently develop and practice the skills that enhance creative achievements

Educational applications

Perhaps the most significant impact of Torrance's research on the measurement of general creative thinking abilities has been on the application of his findings from his tests in a variety of settings. Early in the development of his research program, he outlined what he considered to be five legitimate uses of creativity tests (Torrance, 1963):

1. For obtaining a more complex understanding of human mind and personality and their functioning
2. As a possible basis for individualizing instruction
3. As a part of the process of guiding mental growth, as an indicator of mental health status, and as a source of clues for remedial or psychotherapeutic programs
4. As a means of assessing the differential effects of various kinds of experimental programs, new curricular arrangements of materials, organizational arrangements, teaching procedures, and the like
5. As indicators of growth potential and future guidance needs.

While Torrance (1986) has reflected on these observations and commented that some "were very obvious and trite statements about the use of creativity tests in understanding the human mind and personality and their functioning" (pp. 4-5), he has further commented that educators generally were not very aware of the realities they represented.

> I honestly think we have come a long way since 1963 in our understanding of these aspects of human functioning and that we are more aware of thse matters. This increased understanding is reflected in school curricula, textbooks, other instructional materials, and school buildings themselves (Torrance, 1986, p. 5).

His persistent and consistent descriptions of the creative child, the nature of the creative environment, the teaching and practice of the creative process within the context of subject areas, and the considerations that should be taken into account when evaluating products, have provided a major impetus in changing what happens in the classroom. A small sample of his findings have been that

(1) The environment should be arranged and teaching should be designed to encourage manipulation of objects and ideas, tolerate

new ideas, encourage the habit of working out the full implications of ideas, encourage the acquisition of knowledge in a variety of fields, and provide both active and quiet periods for learning (Torrance, 1959).
(2) Credit should be given for self-initiated learning (Torrance, 1961).
(3) A more humane kind of education for the gifted should be provided that allows for both creative learning and learning by authority; both a mastery of what is known and the creation of new knowledge; both original answers and current ones; and both conforming and nonconforming behavior (Torrance, 1963).
(4) There should be a recognition of the fundamental differences in ways of learning among children, including their desire to explore, test limits, search, manipulate and play with ideas (Torrance, 1965).
(5) By keeping alive the creative proceses of students we naturally provide built-in motivations for learning (Torrance, 1968).
(6) If children are taught in ways compatible with their abilities and interests, their achievements soar and behavioral problems fade (Torrance, 1972).
(7) Successful educational programs for children must be built upon strengths (Torrance, 1973).
(8) Skills of creative problem solving can be taught successfully. The most successful approaches are those that involve both cognitive and emotional functioning, provide adequate structure and motivation, and give opportunities for involvement, practice, and interaction with teachers and other children (Torrance, 1979).
9. It is important to "fall in love with something" and pursue it with intensity and in depth. The driving force behind future accomplishments appears to be people's dream, image, or vision of the future (Torrance, 1983).

The Incubation Model

In 1966, Torrance proposed an instructional model for integrating the teaching of creative thinking skills into the teaching of subject matter. Called the Incubation Model, this three staged model focuses on things that might be done before, during and after a lesson to enhance incuation and creative thinking and action. (Insert Figure 2 about here).

During stage 1, activities are provided that heighten anticipation and expectations and create a desire to know and to find out. The emphasis is on anticipatory learning. Stage 2 involves both anticipatory learning and participatory learning. Stage 3 contains activities designed to continue the process of thinking and learning beyond the lesson.

A lesson planning format devised to construct lessons based on the Incubation Model guide educators in the development of learning experiences that integrate a dominant subject matter objective with a dominant creative skill objective. Before, during and after lesson activities are then developed to accomplish these objectives simultaneously. (Insert Figure 4 about here).

The basic creative thinking skills along with a summary of over 28 years of research that form the basis for this model are outlined in The Search for Satori and Creativity. Soon to be published is a book entitled Getting Students Beyond Aha which contains sample lessons in a variety of subject areas. These are lessons developed by teachers who have used the model. The text also an evaluation model that assesses student performance.

Torrance's Findings Within the Context of Current Investigations

Because of Torrance's rich and varied contributions to the understanding of creative thinking, I have some difficulty in accepting the conclusion that his work only reflects a psychometric approach to creativity. He went so far beyond this narrow categorization. As he has stated

> My chief way of learning about the nature of creativity has been through testing and teaching creative behavior. I believe that these are valid ways of knowing and that testing and teaching creative behaviors have analogues in real-life creative achievements. (Torrance, 1988, p. 58).

Current investigations, especially by those who are looking at information processing theories, are adding some important insights into the understanding of creativity. For example, it is important, as Sternberg (1988) has argued that to really understand the psychological construct of creativity, we need to understand the mental processes of the intellect that underlie it. one is going to do" (1988, p. 132). In a very dynamic way, Torrance has represented many of these mental processes as shall be demonstrated later in this paper.

Though there are many new voices in the effort to understand the nature of creativity, the most vocal and articulate has been Sternberg. Findings from his research shall, therefore, form the primary base for examining Torrance's recearch findings within the context of current investigations into the nature of creativity.

I begin by asking you to examine some of the important similarties in Sternberg's Three-facet model of creativity developed through his dicussion of the intellectual facet of creativity and Torrance's operational defintion of creative thinking. (Insert Figure 3 about here).

Sternberg has stated that "the metacomponents most relevant to creativity per se are the planning components, or what I sometimes calls the 'legislatives ones", in that they legislate what one is going to do" (1988, p. 132). The metacomponents that he delineated were: (1) recognizing the existsence of a problem, (2) problem definition, and (3) formulation of a strategy and mental representation for problem solution. Torrance (1974) has dealt with this same issue when he stated that

> No creative thinking or "satori" is likely to occur until there is a recognition or awareness of a problem and there is some definition of the problem and commitment to deal with it (p. 13).

He continued by defining the many important skills necessary: (1) the ability to describe many specific problems that could be attacked; (2) the ability to identify a variety of aspects of the problem situation, (3) the ability to recognize the "real problem" or the essence of the difficulty which may underlie the stated question. Torrance (1974) concluded that "the goal is to find the statement which, if solved, will clear up the 'mess' or alleviate the problem situation" (p. 13).

Both of these researchers have outlined essentially the same beginning step and supported the importance of this step in creative thinking or performance. Earlier, Torrance (1966) operationally defined this process as one of beoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on, then identifying the difficulty so that one can develop a relevant plan for solution.

In relating his performance component to creative performance, Sternberg (1988) suggested that performance components cn be executed more or less creatively depending on how far beyond a given set of data one is able to go. Further, he noted that the knowledge-acquisition components are also involved ins a specialized form of creativity called insight. He and Davidson (1982, 1984) have asserted that three knowledge-acquisition components form the bases for three different kinds of potentially creative insights:

(1) Selective encoding or the ability to sift out relevant from irrelevant information
(2) Selective combination or the ability to synthesize what might originally seem to be isolated bits of information into a relevant whole that may or may not resemble its parts
(3) Selective comparison or the ability to relate newly acquired information to information acquired in the past (Sternberg, 1988).

Torrance (1966) has stated essentially the same thing in his 1966 definition when he referred to testing and retesting hypotheses and possibly modifying and retesting them. More definitively, he illustrated the presence of these insight components in the activities included in this TTCT, verbal and figural. In his verbal and figural tasks, the more successful performers were those who, first could free themselves to go far beyond a given set of data (performance component) and particularly in the verbal TTCT, demonstrate their insights into problems through their ability to make relevant but not commonplace responses to presented stimuli (an intriguing picture, a toy animal, a commonplace object, or an improbable situation).

Further, Sternberg's delineation of the "manner or style with which one directs one's intelligence" (Sternberg, 1988, pp. 138-142) bear many resemblances to Torrance's observations about creative children and adults. For example, Torrance's description of the creative child is similar to many of Sternberg's notions about intellectual style and creativity.

According to Torrance, (1964)

> The creative child is always asking questions about things that puzzle him. He attempts dificult and sometimes dangerous tasks. He becomes absorbed in his thinking. He is honest, shy, and bashful and may appear to lack consideration for others. Usually the creative child is also independent in his thinking and judgment, strongly determined and persistent industrious and hard-working, possessed of a sense of humor, sincere, sometimes late in completing his work, a self-starter, unsophisticated, playful, emotional, competitive, adventurous, affectionate, never bored, spirited in disagreement, unwilling to accept the judgment of authorities, visionary, and willing to take risks (p. 30).

Various of Sternberg's (1988) intellectual styles relate to the above description of the creative child or adult. For example, his legislative style, he states, is found in people who essentially prefer to order their own lives, prefer open-ended activities, and enjoy creating. In terms of forms of mental self-government, he has noted that

> Creativity is probably not as strongly linked to form of mental self-government as it is to function. Nevertheless, one of the forms lends itself particularly to creative potentialities, namely the anarchic form. Anarchics have the ability to remove themselves from existing constraints, ways of seeing things, and ways of doing things. They are particularly drawn to problems that require a departure from existing rules and principles (Sternberg, 1988, pp. 140-141).

In terms of personality, Torrance (1979) has described many of the attributes Sternberg (1988) defines as being more conducive to creative performance. Some that Torrance (1979) has described as creative thinking skills are listed in his book The Search for Satori and Creativity emotional awareness and sensitivity, the ability to tolerate ambiguity, the courage to be original in one's thinking, the tendency to avoid premature closure, the enjoyment in the use of fantasy, the ability to see humor in situations, persistence, strong visions or future images, and the like. (See Appendix B).

Sternberg (1988) has delineated attributes such as tolerance of ambiguity, willingness to surmount obstacles, willingness to grow, intrinsic motivation, moderate risk-taking, desire for recognition, and willingness to work for recognition.

What Sternberg is achieving in his investigations of creativity is a movement toward (1) a more precise integration of the combination of metacomponent processes with intellectual, stylistic, and personality attributes and (2) a more precise analysis of the infinite number of ways these facets may be combined. I believe that his and others invesitgations into the nature of creativity and will continue to be very important in understanding the mental processes that underlie creativity.

I cannot help but firmly assert, however, that Torrance's pioneering research into creative thinking abilities, creative learning and teaching, the nature of the creative learning environment and the creative product has been significantly important in bringing the discussion of creativity to its present level.

Figure 3

A Sample of Similarities between Sternberg's Triarchic Theory of Creativity and Torrance's Definition of Creativity

Sternberg (1988)	Torrance (1974)
Recognizing the existence of a problem	A process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on
Problem Definition	Identifying the difficulty
Formulation of a strategy and mental representation for problem solution	searching for solutions, making guesses, or formulation hypotheses about the deficiencies
Performance component; Knowledge-acquisition (selective encoding, selective combination, selective comparison)	testing and retesting these hypotheses and possibly modifying and retesting them
Willingness to work for recognition (from Personality component)	communicating the results

Sternberg, R. J. (1988). The nature of creativity. New York: Cambridge University Press.

Torrance, E. P. (1974). The Torrance Tests of Creative Thinking: Technical-norms manual. Bensenville, IL: Scholastic Testing Services.

References

Sternberg, R. J. (1988). The nature of creativity. New York: Cambridge University Press.

Torrance, E. P. (1959). Developing creative thinking through experiences. Paper presented to Minneapolis Teachers League, May 20, 1959.

Torrance, E. P. (1966a). Rationale of the Torrance Tests of Creative Thinking Ability. In Torrance, E. P. & White, W. F. (1969). Issues and advances in educational psychology. Istaca, IL: F. E. Peacock.

Torrance, E. P. (1966b). Torrance Tests of Creative Thinking Ability: Norms-technical manual. (Research edition). Princeton, NJ: Personnel Press.

Torrance, E. P. (1972). Creative kids. Today's Education. 61(1), 25-28.

Torrance, E. P. (1973a). The role of creativity in mental health in the rural south. Paper presented at Conference on Mental Health in the Rural South. Due West, SC: Erskine College.

Torrance, E. P., Khatena, J. & Cunnington, B. F. (1973b). Thinking Creatively with Sounds and Words: TCSW. Bensenville, IL: Scholastic Testing Service, Inc.

Torrance, E. P. (1974). Torrance Tests of Creative Thinking Ability: Norms-technical manual. Bensenville, IL: Scholastic Testing Service, Inc.

Torrance, E. P. (1979a). The elusive aspects of career education. Journal of Research and Development in Education, 12(3), 93-102.

Torrance, E. P. (1979b). The search for satori and creativity. The Creative Education Foundation, Inc. Buffalo, NY: Bearly Limited.

Torrance, E. P. (1981). Thinking Creatively in Action and Movement (TCAM). Bensenville, IL: Scholastic Testing Service, Inc.

Torrance, E. P. (1983). The importance of falling in love with something. Creative Child and Adult Quarterly, 8, 72-78.

Torrance, E. P. & O. Ball (1984). Torrance Tests of Creative Thinking: Streamlined (Revised) Manual, Figural A and B. Bensenville, IL: Scholastic Testing Service, Inc.

Torrance, E. P. (1986). Using the TTCT in education. Bensenville, IL: Scholastic Testing Service.

Torrance, E. P. (1988). The nature of creativity as manifest in its testing. In R. J. Sternberg (1988). The nature of creativity. New York: Cambridge University Press.